P R O D U C T D A T A S H E E T

420 STAINLESS STEEL

UNS S42000

AK Steel

AK Steel Type 420 is a martensitic stainless steel that provides corrosion resistance similar to Type 410 plus increased strength and hardness. It is magnetic in both the annealed and hardened conditions. Maximum corrosion resistance is attained only in the fully hardened or fully hardened and stress relieved condition. It is never used in the annealed condition.

Applications requiring good corrosion resistance and high hardness are ideal for this alloy. Typical uses include cutlery, surgical and dental instruments, scissors, tapes and straight edges. The alloy is not normally used at temperatures exceeding 800°F (427°C) due to rapid softening and loss of corrosion resistance.

COMPOSITION

	%
Carbon	0.15 min.
Manganese	1.00 max.
Phosphorus	0.040 max.
Sulfur	0.030 max.
Silicon	1.00 max.
Chromium	12.00 - 14.00

MECHANICAL PROPERTIES

Typical Mechanical Properties

	UTS ksi (MPa)	0.2% YS ksi (MPa)	Elongation % in 2" (50.8 mm)	Hardness Rockwell
Annealed	85 (586)	40 (276)	25	B88
Hardened And Stress Relieved	230 (1586)	195 (1344)	8	C55

AVAILABLE FORMS

AK Steel produces Type 420 Stainless Steel in coils and cut lengths in thicknesses 0.010" to 0.145" (0.25 mm to 3.68 mm) and widths up to and including 26" (660 mm).

SPECIFICATIONS

AK Steel Type 420 Stainless Steel sheet and strip is covered by the following specifications:

ASTM A 176
AMS 5506

PHYSICAL PROPERTIES

Density, 0.28 lbs/in^3
7.74 g/cm^3

Electrical Resistivity, microhm-in (microhm-cm) 70°F (21°C) – 21.71 (55)

Specific Heat, BTU/lb/°F (kJ/kg•K)
32 - 212°F (0 - 100°C) – 0.11 (0.46)

Thermal Conductivity, BTU/hr/ft^2/ft/°F (W/m•K) 14.4 (24.9)

Coefficient of Thermal Expansion, in/in/°F (um/m•K)
32 - 212°F (0 - 100°C) – 5.7 x 10^{-6} (10.2)
32 - 1200°F (0 - 649°C) – 6.8 x 10^{-6} (12.1)

Modulus of Elasticity, ksi (MPa)
29 x 10^3 (200 x 10^3)

Magnetic Permeability, magnetic

AK STEEL 420 STAINLESS STEEL DATA SHEET

CORROSION RESISTANCE

AK Steel Type 420 provides full corrosion resistance only in the hardened or hardened and stress relieved conditions. In these conditions, its corrosion resistance is similar to Type 410. Type 420 resists corrosion by the atmosphere, fresh water, mine water, steam, carbonic acid, crude oil, gasoline, perspiration, alcohol, ammonia, mercury, sterilizing solutions, soaps and other similar corrosive media.

HEAT TREATMENTS

Annealing: For maximum softness, heat uniformly to 1500 - 1650°F (816 - 899°C) and cool slowly in the furnace.

Process Annealing: Heat to 1350 - 1450°F (732 - 788°C), air cool.

Hardening: Preheat, then heat to 1800 - 1950°F (982 - 1066°C), soak at temperature and air cool or quench in warm oil.

Stress Relieving: Heat at 300 - 800°F (149 - 427°C) for 1 to 3 hours, cool in air or quench in oil or water.

WELDABILITY

The martensitic class of stainless steels has limited weldability due to its hardenability. Special consideration is required to avoid cold cracking by preheating to 550°F (260°C). Post-weld heat treatment should be considered to achieve required properties. This particular alloy is generally considered to have poorer weldability than the most common alloy of this stainless class, Type 410. A major difference is higher carbon content for this alloy which requires both preheat and post-weld heat treatment. When a weld filler is needed, AWS E/ER 420, 410 NiMo and 309L are most often specified. Type 420 is well known in reference literature and more information can be obtained in this way.

FORMABILITY

If annealed for maximum softness, Type 420 can be moderately drawn and formed.

METRIC CONVERSION

Data in this publication are presented in U.S. customary units. Approximate metric equivalents may be obtained by performing the following calculations:

Length (inches to millimeters) – Multiply by 25.4

Strength (ksi to megapascals or mega-newtons per square meter) – Multiply by 6.8948

Temperature (Fahrenheit to Celsius) – (°Fahrenheit - 32) – Multiply by 0.5556

Density (pounds per cubic inch to kilograms per cubic meter) – Multiply by 27,670

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Stainless Steel The Value Option

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